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SAMPLING AND ANALYSIS PLAN FOR THE REMEDIATION OF RYAN'S PIT, OPERABLE UNIT 2

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SAMPLING AND ANALYSIS PLAN FOR THE REMEDIATION OF RYAN'S PIT, OPERABLE UNIT 2 AUGUST 28, 1995

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Approval By

Greg DiGregorio for R S Luker

Quality Assurance 09 01 95 **Date**

Accelerated Actions 9-1-95 **Date**

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ACRONYMS

BSL	Background screening level
CLP	Contract Laboratory Program
COC	Contaminants-of-Concern
DCE	Dichloroethene
DMP	Data Management Plan
DQO	Data Quality Objective
EQS	Environmental Quality Support
ER	Environmental Restoration, aka ERM, Environmental Restoration Management
GC	Gas Chromatograph
GRRASP	General Radiochemistry and Routine Analytical Service Protocol
IHSS	Individual Hazardous Substance Site
OU	Operable unit
PAM	Proposed Action Memorandum
PCE	Tetrachloroethylene
PID	Photoionization Detector
PPRG	Programmatic Preliminary Risk -Based Remediation Goal
QAA	Quality Assurance Addendum
QAPjP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control
RFETS	Rocky Flats Environmental Technology Site
RFEDS	Rocky Flats Environmental Database System
SAP	Sampling and Analysis Plan
SQL	Sample quantitation limit
SVOCs	Semi-volatile organic compounds
TCE	Trichloroethylene
TCL-VOA	Target Compound List-Volatile Organic Analysis
USEPA	United States Environmental Protection Agency
VOCs	Volatile organic compounds
1,1-DCA	1,1-Dichloroethane
1,1-DCE	1,1-Dichloroethene
1,2-DCE	1,2-Dichloroethene
1,1,1-TCA	1,1,1-Trichloroethane

SAMPLING AND ANALYSIS PLAN FOR THE REMEDIATION OF RYAN'S PIT, OPERABLE UNIT 2

1 0 INTRODUCTION

This Sampling and Analysis Plan (SAP) and attachments describe the specific sampling and analysis requirements to document the source removal action described in the Proposed Action Memorandum (PAM) for the Remediation of Ryan's Pit, Operable Unit (OU) 2, Rocky Flats Environmental Technology Site (RFETS) The specific Data Quality Objectives (DQOs) are listed in Appendix B, the QA/QC Plan

The objective of the SAP is to describe the specific data needs, sampling and analysis requirements, data handling procedures, and associated Quality Assurance/Quality Control (QA/QC) requirements for the completion of soil sampling conducted as part of the Ryan's Pit removal action

The SAP contains three sections Section 1 provides the introduction, Section 2 describes the Ryan's Pit removal action and the results of previous sampling, and Section 3 describes the number and locations of samples and the sample collection and handling procedures

Appendix A is the Data Management Plan and Appendix B is the QA/QC Plan for this sampling This SAP will be conducted under the quality umbrella of the Environmental Restoration (ER) sitewide Quality Assurance Project Plan (QAPjP)

2 0 RYAN'S PIT REMOVAL ACTION PROJECT DESCRIPTION

The Individual Hazardous Substance Site (IHSS) 109, Ryan's Pit, was used from approximately 1966 through 1970 to dispose of nonradioactive liquid chemicals The organic chemicals, disposed in small quantities, included tetrachloroethylene (PCE), trichloroethylene (TCE), and possibly diesel fuel Other materials that were disposed in the trench included paint thinner and small quantities of construction-related materials

Organic compounds from miscellaneous small projects, e g bench scale testing and special projects were believed to be collected for disposal at Ryan's Pit Normal process waste solvents from production buildings are not believed to have been poured in Ryan's Pit

The trench is approximately 25 feet by 12 feet by 6 feet deep The dimensions are based on a field investigation and sample collection performed in the spring of 1995 and historical accounts by a health physicist familiar with the trench location Recently, the perimeter of the trench was land surveyed (Figure 2 0-1) The trench lies within an area where surficial soils are contaminated with americium-241 (Am-241) and plutonium-239 (Pu-239) These contaminants were deposited by wind transport from the 903 drum storage area (IHSS 112)

Based on the historical information about the use of Ryan's Pit, radiological wastes were not known to have been disposed of in the trench The radiological contaminants identified in soils during the remedial investigation were collected by compositing samples from 0 to 9 feet in depth and may have resulted from the surficial contamination in the area due to the proximity to IHSS 155, the 903 Lip Area

2 1 Hydrogeologic Conditions

Ryan's Pit is located downslope of the erosional edge or extent of the Rocky Flats Alluvium Colluvium that is principally derived from the Rocky Flats Alluvium is present at the ground surface and extends approximately six feet beneath the base of the trench These surficial deposits are underlain by the Arapahoe Formation consisting of weathered claystones and tight sandstones Groundwater occurs seasonally within the trench rising above the base of the trench during wet seasons

2 2 Proposed Action

The proposed action is a VOC source removal for Ryan's Pit The excavation will remove the VOC contaminated material existing in the trench and any additional contaminated soil existing beyond the side and lower boundaries of the trench (However, if bedrock is encountered before the additional buffer is excavated the excavation will terminate at bedrock) The efforts to overexcavate this trench are to remove potential VOC contaminated source material beyond the trench boundaries that could transmit contaminants to the groundwater Any additional VOC contaminated material will be identified based on field observations of visible organic chemical staining or levels of VOC contamination identified by a field gas chromatograph, exceeding Programmatic Preliminary Risk-Based Remediation Goals (PPRG)

The remediation of Ryan's Pit will entail the excavation of approximately 200 cubic yards of material As a first measure, the surficial soils (approximately the top six inches) of the trench will be laid back away from the planned excavation area of the trench This will prevent the Am-241 contaminated lip area soils from being commingled with the Ryan's Pit soils A backhoe will be used to excavate the soil from the trench The equipment will be selected with preference towards excavators that minimize worker exposure to the trench and minimize shoring requirements Samples will be collected from the trench walls and floor and analyzed per the instructions listed in Table 3 1

The contaminated soil will be containerized in roll-off boxes and staged for on-site treatment by low temperature thermal desorption These soils will then be analyzed for volatile organics, TCLP metals, and radionuclides (Pu, U, Am) and if the performance goals specified in Section 2 2 4 of the draft PAM Corrective Action Permit Modification (RF/ER-95-0103 UN) are met, the soils shall be returned to the trench site If dewatering of the trench is necessary, a field sump will be created in the trench and pumped out with a portable submersible pump into a temporary storage tank Water in the tank will be sampled prior to treatment for TCL-VOC analytes The water will be treated in Building 891, the OU 2 Field Treatability Unit, the planned Sitewide Consolidated Water Treatment Facility, or in Building 374, then sampled and released in accordance with respective discharge criteria Alternatively, the water may be taken offsite for treatment and disposal if appropriate (water containing untreatable levels of VOC or free phase VOC)

2 3 Historical Data Summary

Soil samples were collected from a series of boreholes (09291, BH2587, 21891, 09491) located downgradient of Ryan's Pit in 1992 The data is presented in the OU 2 Draft Phase II RFI/RI Report, May 1995, and is briefly summarized in Table 2 3-1 Further detail is available in the PAM (RF/ER-95-0097 UN)

VOCs detected in subsurface samples collected at Ryan's Pit included PCE, TCE , toluene, and xylenes The depth to the seasonal high groundwater level is approximately 3 6 feet Therefore, most of the VOC maximum concentrations detected were found in samples collected below the water table

All of the semi-volatile organic compounds (SVOCs) analyzed for were at concentrations below their respective sample quantitation limits (SQLs)

Several radionuclides were detected above the Background Screening Levels (BSL, two standard deviations above means derived from 1993 and 1995 Geochemical Characterization Reports) However, only Pu-239/240 (a subsurface soil COC) exceeded the BSLs (0 066 pCi/g) The maximum detected activity of Pu-239/240 was 3 2 pCi/g, associated with a sample collected at a depth of 0 to 9 feet One sample analyzed had a detected Am-241 activity (0 22 pCi/g) that exceeded the BSL (0 022 pCi/g) by one order of magnitude

During the spring of 1995, soil borings were collected in the actual trench by using a geoprobe The preliminary volatile organic data shows high concentrations of TCE, PCE, toluene, and xylene The concentrations of the volatile organic compounds are identified in Table 2 3-1 During the sampling event, the investigation crew noticed a black stained soil collected at a depth of 4 feet in the borehole 13395

Table 2 3-1
Ryan's Pit Data Collected March 1995*
Maximum Concentrations for Analytes

Analyte	Concentration (ppb)	Location	Depth (ft)
1,1,1-TCA	430,000	13395	3-5
TCE	20,000	13295	3-5
PCE	470,000	13395	3-5
Toluene	310,000	13395	3-5
Ethylbenzene	92,000	13395	3-5
Xylene	590,000	13395	3-5
1,1-DCE	94	13395	3-5
1,1-DCA	340	13395	3-5
2-Butanone	110 J**	13395	3-5
1,2-Dichloropropane	330 J**	13295	3-5
4-Methyl-2-pentanone	5,300	13295	3-5
1,1,2-TCA	10 J**	13395	8-10
1,1-DCE	94	13395	8-10
1,1-DCA	340	13395	8-10
1,1,1-TCA	260	13395	8-10
TCE	100	13395	8-10
Toluene	220	13395	8-10
Xylene	40	13395	8-10

*Data is unvalidated
** J qualifier for organic detections indicates an estimated result

The downgradient monitoring wells, 07391 and 0271, show similar contaminants in the groundwater as those which are present in soils in Ryan's Pit Table 2 3-2 shows a data summary of the detectable organic contamination in the groundwater

Table 2 3-2
Groundwater Well Data Downgradient of Ryan's Pit

Groundwater Monitoring Well 07391

Analyte	Concentration (ug/l)	Sample Date	MCL[1] (ug/l)
Chloroform	1200	12-5-94	100
Chloroform	1100	3-14-95	100
PCE	600	12-5-94	5
PCE	780	3-14-95	5
TCE	65000	12-5-94	5
TCE	67000	3-14-95	5

Groundwater Monitoring Well 0271 (abandoned)

Analyte	Concentration (ug/l)	Sample Date	MCL[1] (ug/l)
1,1,1-TCA	12	2-25-92	200
1,2-DCE	180	2-25-92	100
Chloroform	75	2-25-92	100
PCE	57	2-25-92	5
TCE	4800 J	2-25-92	5

[1] Maximum Contaminant Level as determined by Safe Drinking Water Act

3 0 SAMPLING APPROACH AND REQUIREMENTS

The objectives of the sampling and analysis are to document concentrations of volatile organic compounds and radionuclides in residual undisturbed soils (see Table 3 1), to determine the concentration of volatile organics in the soils before and after treatment by thermal desorption, to document the concentrations of Pu, U, Am, and metals in soil returned to the trench and to characterize any water removed from the trench Data Quality Objectives are developed in Section 2 3 1 of Appendix B, QA/QC Plan Table 3 1 shows the sampling scheme that will be used to document the undisturbed margins of the pit after excavation Water samples other than rinsates will be collected only if groundwater is produced from the trench and only to properly characterize the water for disposal Soil samples shall be collected for Target Compound List-Volatile Organic Analysis (TCL-VOA), TCLP metals, and the radionuclides plutonium 239/240, uranium, and americium 241

Ten samples shall be collected upon completion of the trench excavation Four samples shall be collected from locations about equally spaced along the bottom of the excavation The approximate locations are shown in Figure 3 0-1 One sample shall be collected at locations approximately mid-depth and mid-length along each side of the excavation, and at mid-length positions at the base of the trench on the uphill and downhill sides Sampling depths and positions may be adjusted based on field observations Also, Quality Control (QC) samples shall be collected including one duplicate soil sample and one rinsate (liquid) sample One trip blank will be shipped with samples for volatile analysis A field blank will be prepared and analyzed for the same volatile organic compounds as the real samples The field blank will determine whether real samples may have been cross-contaminated by ambient conditions in the field Table 3 1 summarizes the analytical requirements for the unexcavated margin

Table 3 1 Excavation Boundary Analysis

Soils Analysis

Analysis/Method	Trench Samples	QC Samples	Total Samples	Container/Preservatives/Holding Time
Volatile Organics/TCL-VOA	10	1 duplicate	11	4 oz glass w/ Teflon liner/4°C/ 7 days
		1 field blank	1	4 oz glass w/ Teflon liner/4°C/ 7 days
Radionuclides/ Am241 Pu239/240 U Alpha Spec	10	1 duplicate	11	500 ml glass jars/NA/61 days
		1 field blank	1	500 ml glass jars/NA/61 days
Water Analysis	Tank Sample			
Volatile Organics/TCL-VOA	1-3 (as necessary)	1 rinsate	2-5	2-40 ml VOA vials/4°C/7 days
		1 trip blank per cooler	1-3 (as necessary)	2-40 ml VOA vials/4°C/7 days * containers filled by laboratory
Radionuclides/ Am241 Pu239/240 Alpha Spec	1	1 rinsate	2	1 gal poly/HNO_3/61 days

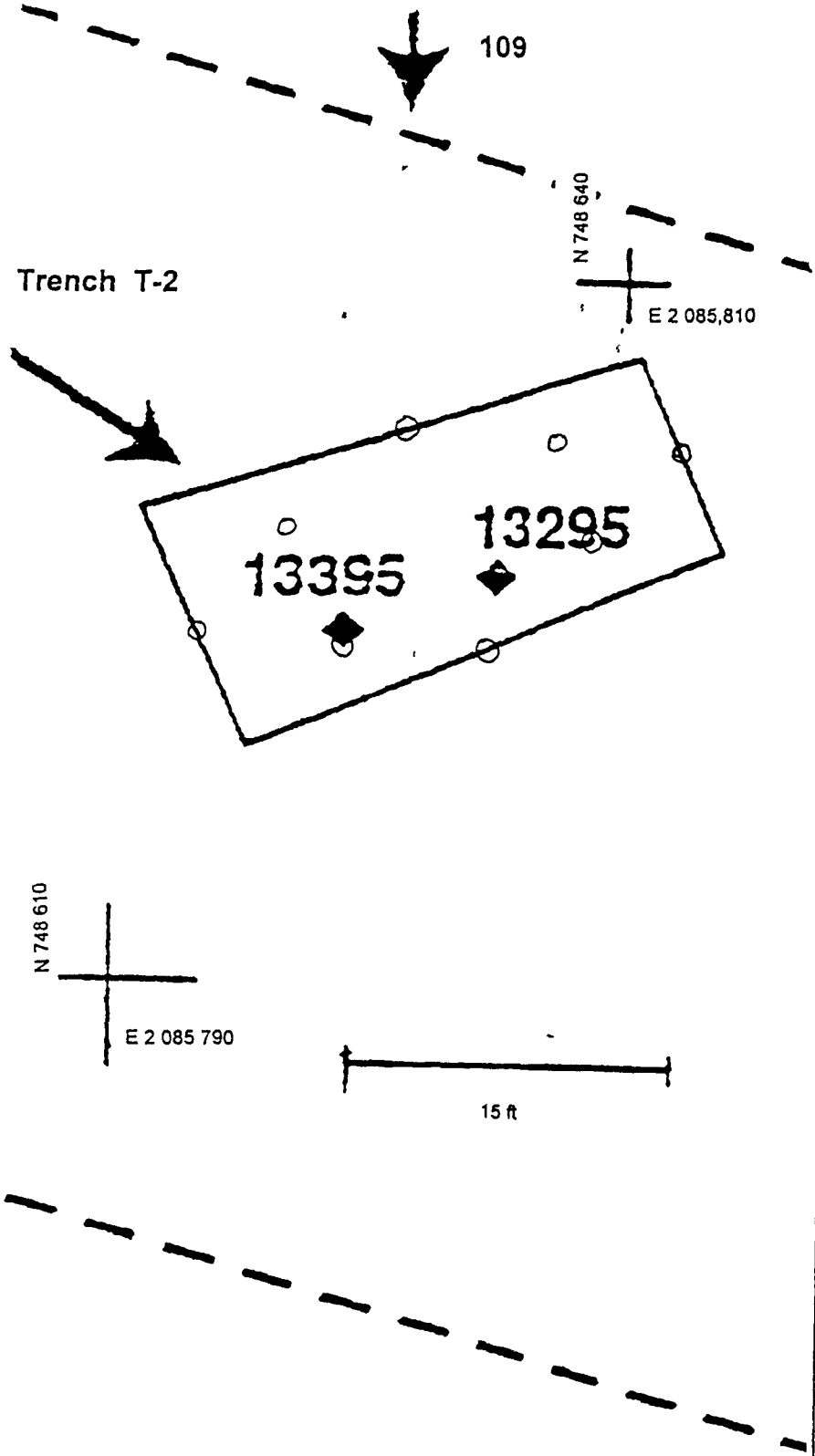

Figure 3 0-1

Operable Unit 2
IHSS 109
Trench T-2

Sample Locations

Sampling Types

- Borehole
- Groundwater Well
- Geoprobe Site
- Grab Sample

Standard Map Features

- IHSS Boundary
- Trench Boundary
- Fences
- Paved roads
- Dirt roads

DATA SOURCE
Buildings roads and fences provided by
Facilities Engr
EG&G Rocky Flats Inc 1991
Hydrology provided by
USGS (date unknown)

State Plane Coordinate Projection
Colorado Central Zone
Datum NAD27

U S Department of Energy
Rocky Flats Environmental Technology Site

MAP ID Draft JUN 30 1995

Because of the hazards associated with entry into steep-sided unsupported excavations, field personnel shall not enter the excavation Each sample shall be collected from the excavated trench by means of a backhoe The backhoe bucket and sampling tools shall be decontaminated immediately prior to each sampling event to prevent cross-contamination of samples All derived liquids shall be collected and sent to the appropriate facility for treatment or disposal in accordance with the appropriate SOPs referenced in Table 2 3-4 of Appendix B The excavated soil contained in the backhoe bucket shall be elevated from inside the trench to the ground surface At the ground surface, sufficient quantities of soil shall be transferred from the bucket to adequately fill the sample containers using a stainless steel spatula All sampling equipment will be properly decontaminated between samples Soils for volatile analysis will be collected directly into the sampling jar to minimize loss of VOCs Volatile samples will be collected from soils that are not directly adjacent to the backhoe blade Samples will be collected immediately after excavation, and handling will be kept to the minimum necessary to ensure there is no excessive loss of VOCs

Grab samples will be collected from excavated soils prior to thermal desorption processing for radionuclide, TCLP metals, and organic analysis Samples for TCLP metals, and radionuclide analyses will be composited from each roll-off container from multiple subsamples representing multiple locations in the roll-off Samples for volatile analysis will be collected in a similar fashion as the thermal desorber is being loaded These analyses will document the organic content of the soil being processed, and also document the radionuclide and metals content of soils being placed in the trench following treatment as the treatment process will not affect radionuclide or metals content The soil treatment unit will accept the contaminated soil in batches of approximately 3-5 cubic yards One grab sample will be collected per batch, as described in Table 3 2 Samples for VOC analysis will be collected at the rate of one per batch after treatment to document treatment efficiency Process samples will be analyzed by an on-site gas chromatograph to minimize usage of external laboratories One in ten after process samples will be collected in triplicate for QA/QC purposes using analysis by the onsite GC, duplicate analysis by the onsite GC, and analysis by an offsite laboratory

Table 3 2 Process Soil Analysis

Analyte/ Method	Pre-process Samples	QC Samples	Total Samples	Containe rs/preserv ative/holding time
Volatiles/ Onsite GC/ TCL-VOA	1 per batch, 50 batches	1 duplicate per 10 batches	55	4 oz glass w/ Teflon liner/4°C/7 days
Volatiles/ EPA (offsite lab) M 8240		1 per 10 batches	5	4 oz glass w/ Teflon liner/4°C/7 days
TCLP-Metals/ EPA Meth 1311, 6000, 7000	1 per roll-off	1 per 10 batches	1 1	250 ml glass jars/NA/61 days
Pu239/240 Am241 U Alpha Spec	1 per roll-off	1 per 10 batches	1 1	500 ml glass jars/NA/61 days
Post-process samples				
Volatiles/ Onsite GC/ TCL-VOA	1 per batch 50 batches	1 duplicate per 10 batches	55	4 oz glass w/ Teflon liner/4°C/7 days
Volatiles/ EPA (offsite lab) TCL-VOA Meth 8240		1 per 10 batches	5	4 oz glass w/ Teflon liner/4°C/7 days

All laboratory work will be done according to the U S Environmental Protection Agency's (USEPA's) Contract Lab Program (CLP) standards The CLP-type analysis is outlined in the document entitled "EG&G Rocky Flats, General Radiochemistry and Routine Analytical Service Protocol (GRRASP) version 3 0, 1994 " Sample labeling, handling, and shipping shall be performed in accordance with FO 13, "Containerization, Preserving, Handling and Shipping of Soil and Water Samples "

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1 0 INTRODUCTION

The purpose of this Data Management Plan (DMP) is to support the Sampling and Analysis Plan for the Remediation of Ryan's Pit and to specify the mechanisms and procedures for the transfer of data from its collection to storage The DMP lists elements defining personnel responsibilities, sample documentation, sample tracking, data entry, and data proofing The remediation of Ryan's Pit will collect and analyze data from

- Onsite and laboratory analysis of soil samples for volatile organics, including QC samples
- Laboratory analysis of water to determine treatment options (if necessary)
- Laboratory analysis of soil samples for radionuclides and metals

Data will be managed according to the customary procedures including

- FO 14, "Field Data Management "
- 3-21000-ADM - 17 01, "Quality Assurance Records Requirements "

These procedures will ensure that data is collected, entered and stored in a secure controlled, and retrievable environment After entry into the interim database Datacap, the data will be uploaded to the Rocky Flats Environmental Database System (RFEDS) database

2 0 PERSONNEL RESPONSIBILITIES

The Project Manager is be responsible for ensuring that all data are collected, verified, transmitted and stored in a manner consistent with this DMP and in compliance with relevant Operating Procedures The Project Manager will obtain from the RFEDS User System Manager sample numbers and location codes The User System Manager will verify any transmitted record for accuracy and completeness and ensure the data is preserved, retrievable, and traceable

The sample crew personnel will be responsible for field data collection Their data management tasks will include completing all appropriate data management forms and completing the Chain-Of-Custody form The sample crew delivers forms and Chain-of-Custodies to the Data Manager

The Sample Manager/Data Manager is responsible for verifying that the Chain-of-Custodies are complete and accurate before the samples are shipped to the laboratory The sample and data manager obtains the preliminary Radiological screen, from the onsite lab, for release of the samples offsite The manager's duties include data entry into Datacap, and transmitting field information, sample collection data and Chain-of-Custody tracking data to RFEDS All QA records will be submitted from the manager to the project manager, and ultimately to the ER Records Center (via the PM)

3 0 DOCUMENTATION

Field instrument data sheets, field logbooks, and sample collection forms should include the following information for each data or sample point

- field sample identification,
- date and time sampling/measurement,
- sample location,

- sample description,
- sample depth (if appropriate),
- parameters or analyses being reported,
- associated QA/QC samples, and
- field measurements made by field instruments
- equipment model and serial numbers with latest calibration date where applicable
- background readings and measurement units

4 0 DATA ENTRY AND DATA PROOFING

Data collected manually consists of field measurements from Ludlum or equivalent alpha and gamma monitoring instruments, PID, and gas chromatography instruments These field measurements shall be recorded on the appropriate form Soil sample information shall be recorded on form FO 14G, "Pit and Trench Form " The data shall be entered into Datacap These forms will be reviewed by the project manager prior to data entry A hard copy of the manually entered data will be initialed and dated by the project manager and the data manager

Data will be checked for transcription errors, accuracy, and to ensure that all samples that were intended to be collected were collected, shipped and entered into datacap Changes or corrections may be required in the data stored in Datacap All changes must be accompanied by a data correction/change form (figure 4-1) The form will detail the changes to be made and document that the changes were completed Corrections to the database will be reviewed by the data manager or designee for potential entry errors

5 0 FINAL REVIEW

The following actions are designed to ensure the final data submitted to RFEDS is complete and correct and they are consistent with the procedure FO 14 "Field Data Management"

- A hard copy of the data organized by location will be verified by the Data Manager or designee
- All corrections to the hard copy will be made in red ink
- Using the data entry sheets and sample collection sheets, check that data identifications are correctly listed on the hard copy, and the number of samples collected and shipped is correct
- Check that all the parameters requested for each analysis are reported on the hard copy and that units reported on the hard copy are correct
- Check values for all manually collected parameters reported from the database against the field collection forms
- The data will then be reviewed by a scientist familiar with the project objectives and data collection activity to disposition data containing gross errors
- Check the corrected copy of the database to determine that corrections have been implemented

Figure 4-1
DATA CORRECTION/CHANGE FORM

The following changes and/or corrections to the database are required (check all that apply)

_____ Data qualifiers have been assigned to the attached sample data

_____ The following sample analyses have been changed

_____ Other changes or corrections (describe below)

Changes Requested By _____
(Print Name) (Signature) (Date)

Changes Made By _____
(Print Name) (Signature) (Date)

Changes Checked By _____
(Print Name) (Signature) (Date)

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1 0 INTRODUCTION

This Appendix consists of the quality assurance addendum (QAA) for the remediation of Ryan's Pit The QAA identifies the QA requirements and measures to implement the requirements that apply to the remediation action This document is a supplement to the RFETS QAPjP and it defines the site specific QA controls applicable to the activities described in this SAP

2 0 QUALITY REQUIREMENTS

The following outlines the quality requirements for the remediation of Ryan's Pit SAP

2 1 Organization and Responsibilities

The Accelerated Cleanup Team in the ER organization is responsible for the overall coordination of the remediation of Ryan's Pit Other organizations such as the Analytical Services Organization and the subcontracted external laboratory will be involved with this work Responsibilities of other organizations will be assigned by the Accelerated Cleanup Team

An organization chart for this project is shown in Figure 2 1-1 The organization has been structured to maintain a high level of quality in all areas of work to be performed Conformance to established requirements shall be verified by individuals not directly responsible for performing the work The Accelerated Cleanup Team is responsible for management and coordination of resources dedicated to the project

2 2 Quality Assurance Program

2 2 1 Training

The minimum personnel qualification and training requirements that are applicable to staff for ER Program activities are addressed in Section 2 0 of the QAPjP Qualification records shall be provided for all personnel to document fitness to perform their assigned tasks The Project Manager shall identify any specialized training requirements that are applicable to individual project personnel Field personnel involved in sampling shall have the following training

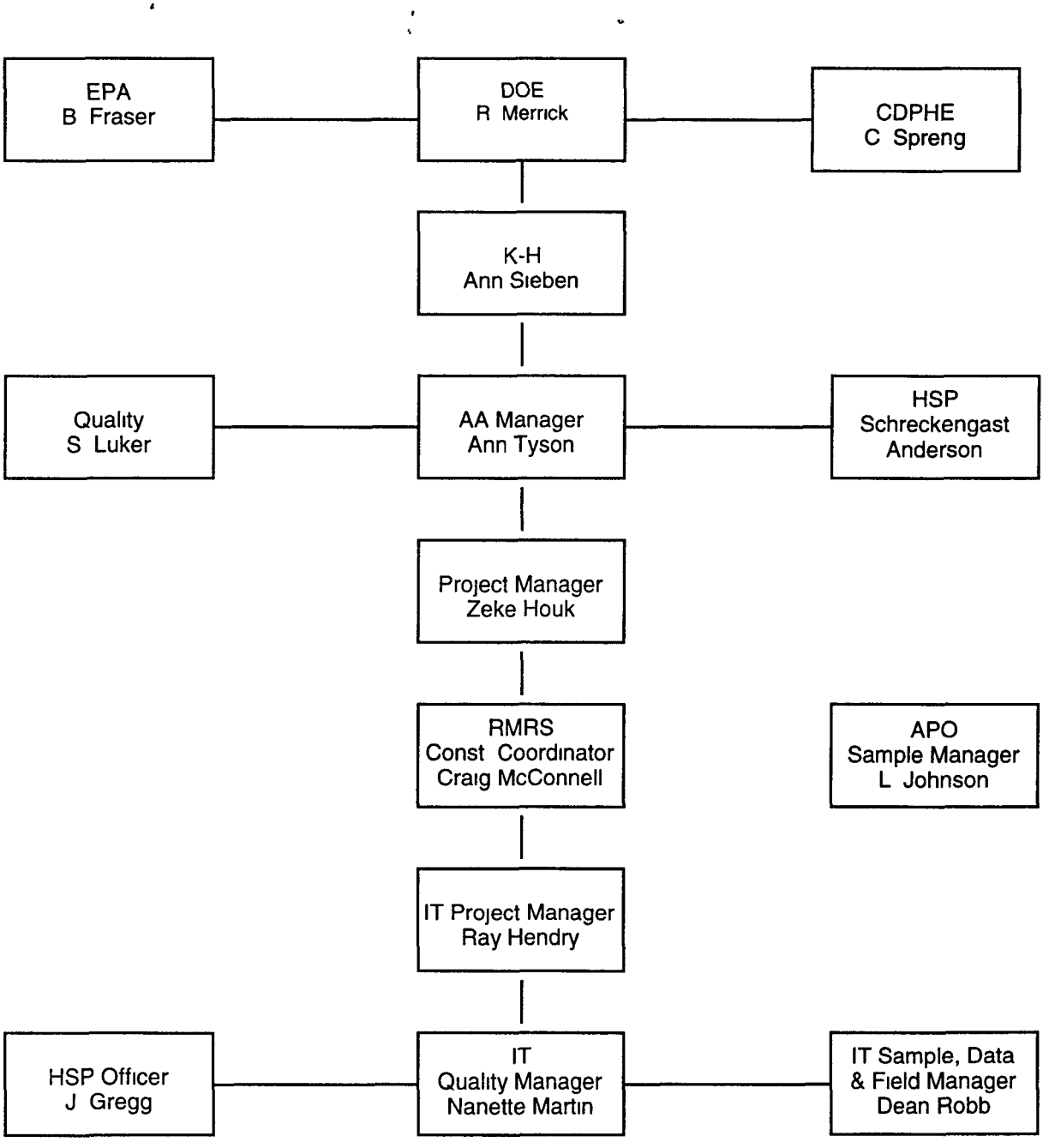
OSHA 40-hour HAZWOPER
OSHA On the Job Training Checklist
RCRA Computer Based Training
RCRA Supervisors Checklist
Applicable Operating Procedures
QAPjP Requirements

2 2 2 Quality Assurance Reports

A section summarizing the project's quality assurance will be included in the project completion report at the conclusion of the Ryan s Pit remediation activities This section will include a summary of inspections, lab assessments, surveillances and data verification/validation results

Figure 2 1-1

Ryan's Pit Remediation Organization Chart



2 3 Control of Scientific Investigations

2 3 1 Data Quality Objectives

The Data Quality Objectives for the sampling and analysis are presented in Table 2 3-1

Statement of the Problem

A source of contamination from volatile organic compounds has been identified in a buried trench in IHSS 109 The trench is approximately 25' x 12' x 6' deep based on historical information, and cumulative sampling data from monitoring wells, soil gas surveys, boreholes through the trench and aerial photographs Source removal will be conducted to remove most of the contamination This source removal will be aided by VOC analysis with a portable field GC (described below) Sampling will then be conducted to document the VOC concentration levels remaining in the former trench site and at its boundaries

The contaminated soil, removed from the trench will be treated onsite with a low temperature thermal desorption unit to remove the VOC contamination Treatment is expected to take place in batch loads of approximately 3-5 cubic yards each Data will be collected to document the removal efficiency of the treatment unit Therefore, samples will be collected from the same batches both before and after treatment Post treatment samples will also be used to show that performance criteria for the unit have been attained The performance criteria developed for the thermal desorption unit states that all VOC contamination will be removed to levels that are at or below the delisting criteria for organic compounds described in *A Guide to Delisting of RCRA Wastes for Superfund Remedial Responses*, USEPA Office of Solid Waste and Emergency Response (OSWER)[1] This performance criterion is more specifically defined in the *Draft Proposed Action Memorandum and Draft Modification of Colorado Hazardous Waste Corrective Action Section of the Operating Permit for RFETS* (Document # RF/ER-95-0103 UN) for this project A more complete listing of the samples and what decisions they will be used for is described below

Decisions/Data Types

Data will be collected to answer the following questions

1) After removal of the general source area (geometry), and removal of any visible organically stained or additional gross contamination, will residual VOC contamination remain above the PPRG values listed in *Programmatic Risk Based Preliminary Remediation Goals,* USDOE February 1995

Data Types Field Screening with a portable GC from samples collected around the pit bottom and sides Observational approach, at least 10 samples will be analyzed and additional samples may be collected by the onsite field supervisor Note, if field screening indicates levels above the values referenced above, source removal will continue, as appropriate

2) After onsite field screening indicates that residual contamination has been removed below levels referenced above, samples will be collected as described in (Section 3 0 of the SAP) to definitively document volatile organic and radiological levels remaining at the boundaries of the trench excavation

Data types Samples will be collected for analysis of VOCs, and radionuclides as defined in Table 3 1 of the SAP

[1] *A Guide to Delisting of RCRA Wastes for Superfund Remedial Responses* USEPA Office of Solid Waste and Emergency Response (OSWER) Directive 9347 3-09FS, September 1990

3) After completion of the excavation, samples will be collected to aid in determining if soil can be placed back into the trench after processing Therefore, samples for metals and radionuclides will be collected after excavation, and before processing so that the data can be received early for prompt evaluation The decision for metals and radionuclide containing soils to be returned to Ryan's pit after processing will be based on average radionuclide content being below the PPRGs listed in *Programmatic Risk Based Preliminary Remediation Goals,* USDOE February 1995 and the average TCLP concentration being below the limits for metals defined in 6 CCR 1007-3, Section 261 24

Data types One composite sample made up of at least 5 subsamples will be collected from each, (up to 10) roll-off containers containing Ryan's pit soils These subsamples will be collected in a systematic manner, and will be used to determine average metals and radionuclide content within the soil The samples will be analyzed for radionuclides, and TCLP metals as described in Table 2 3-1 of Appendix B and Table 3 2 of the SAP

4) Two questions will be answered relating to treatment of the VOC contaminated soils

1) What is the removal efficiency or percent reduction of the organic contaminants?
2) Are the VOC performance standards being met on the treated soil?

Data types Samples will be collected from every batch of soil, before and after treatment The batch size is expected to be 3-5 cubic yards The samples will be collected from approximately five subsample grabs as the soil is being loaded into the thermal desorption unit Samples will be analyzed with a portable GC Corresponding samples will be collected from the batch after processing (post processing samples) and analyzed in the same manner The analyses will allow project personnel to determine removal efficiency of treated soils In addition, approximately every 10 batches, a confirmatory triplicate sample will be collected and analyzed in an offsite laboratory for VOCs (in addition to a regular and duplicate sample for onsite GC analysis) These samples will allow for an evaluation that performance goals, as stated in the PAM/Permit Modification for the treatment unit have been attained After processing, the distribution of residual VOCs is expected to be homogenous thus allowing for the variation in sampling frequency from the metals and radionuclide sampling scheme

Design Optimization The optimum number of samples required to meet the decision errors specified for the documentation of residual contamination remaining at the boundaries of the trench excavation are given in Table 2 3-2 The number of samples given probably represents confidences slightly higher those specified due to the statistical assumption of simple random sampling, while the actual sampling strategy consists of one biased toward historical knowledge, and therefore more probability of intersecting relatively higher volumes of contamination The table also presents design parameters used in the Decision Error Feasibility Trials (DEFT), Version 4 0 (9/94) software by EPA

The table consists of the most conservative (most protective of human health and environment) scenario with respect to the VOC volatile organic compounds, i e , the lowest applicable PPRG, which is 5440 mg/kg for trichlorethene (TCE, construction worker in subsoil scenario) Comparisons of average real sample results with PPRGs must be made for each chemical of concern

Table 2 3-1
Data Quality Objectives

Data Quality Objective	Assurance Method
Document concentrations of VOCs in residual and undisturbed soils	Ten soil samples to be taken from trench floor and sides at equal spacing Two QC samples (1 duplicate, 1 rinsate) Testing includes USEPA CLP TCL-VOA, Pu239/240, U, and Am241 the RFETS GRRASP Sampling procedures per Section 3 0 of the SAP
Characterize any water produced during de-watering activities to determine if treatment is necessary	One grab sample of water will be collected from each holding tank and analyzed for TCL volatile organics
Pre and post-treatment characterization of soils to document treatment process effect	One grab sample per batch will be collected prior to and following treatment These samples will be analyzed for volatile organic compounds using an on-site gas chromatograph One sample per 10 will be collected in triplicate, with analysis by the on-site GC, duplicate analysis with the on-site GC, and off-site analysis by EPA Method 8240 to confirm the analysis by the on-site GC
Characterize the radionuclide and metals content of soils to be treated and returned to the trench	One composite grab sample per roll-off will be collected prior to treatment These samples will be analyzed for TCLP metals, Pu239/240, U, and Am241

Table 2 3-2
Parameters For Sampling Design Optimization

Input
Action Level (TCE, construction workers for soils) 5440 mg/kg
Grey Region =5440 - 9085 mg/kg (action level + 1 standard deviation)
Standard Deviation 3645 ppm
note standard deviation of the mean is assumed to be 67% of the mean, consistent with the central limit theorem
Null Hypothesis H_0 m<5440 ppm
Alternate Hypothesis H_A m>= 5440 ppm
Decision Error
False Positive (reject H_0 when H_0 is really true) 10% (90% confidence in decision)
False Negative (accept H_0 when H_0 is really false) 5% (95% confidence in decision)

Output
Number of sample required to meet confidence levels described above 10

PARCC Parameters

Precision accuracy, representativeness, completeness, and comparability (referred to as PARCC parameters) are fundamental parameters used to indicate data quality The PARCC parameters are summarized in Table 2 3-3 Determination of the PARCC parameters is described in ERM Procedure 2-G32-ER-ADM, 08 02, *Evaluation of ERM Data for Usability in Final Reports*, (EG&G, 1994)

Table 2 3-3
Parcc Parameter Summary

	Analytical
Precision	Sample Relative Percent Difference <=30%
Accuracy	Adherence to the GRRASP
Representativeness	Based on use of SOPs and Section 3 0 of the SAP
Comparability	Based on the use of SOPs, GRRASP, and Section 3 0 of the SAP
Completeness	Usable data from 90% of the planned field samples and =>50% of lab data validated

2 3 2 Work Processes

The SOPs listed in Table 2 3-4 and 2 3-5 will be used to accomplish work described in the SAP

Table 2 3-4
Field and Administrative Standard Operating Procedures

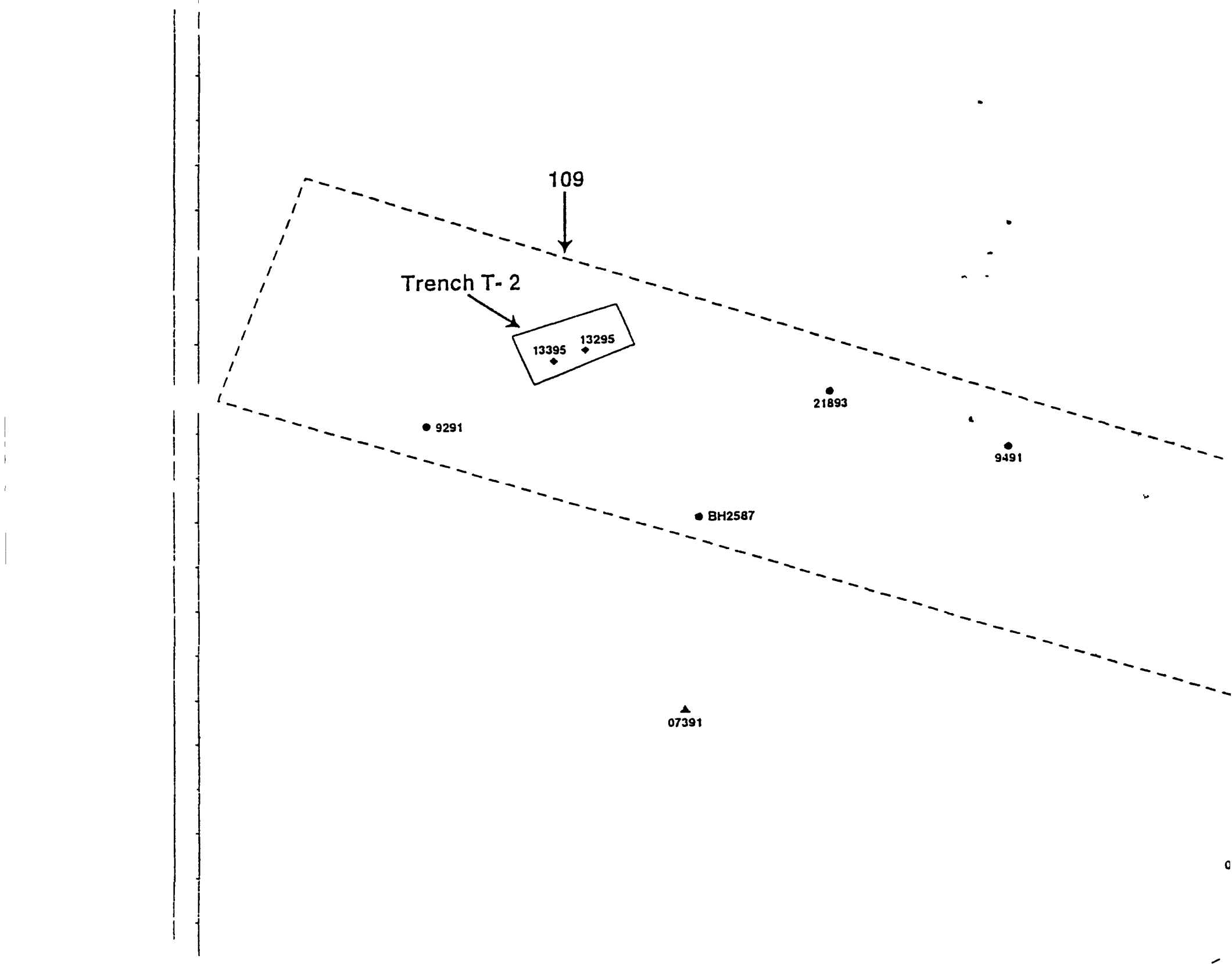
Identification Number	Procedure Title
5-21000-OPS-FO 3	General Equipment Decontamination
5-21000-OPS-FO 6	Handling of Personal Protective Equipment
5-21000-OPS-FO 7	Handling of Decontaminated Water and Waste Water
5-21000-OPS-FO 10	Receiving,Labeling, and Handling Environmental Materials Containers
5-21000-OPS-FO 11	Field Communications
5-21000-OPS-FO 12	Decontamination Facility Operations
5-21000-OPS-FO 13	Containerization Preserving, Handling, and Shipping of Soil and Water Samples
5-21000-OPS-FO 18	Environmental Sample Radioactivity Content Screening
2-G06-ER-ADM-05 10	Use of Controlled Scientific Notebooks
2-G32-ER-ADM-08 02	Evaluation of ERM Data for Usability in Final Reports
4-E42-ER-OPS-GT 08	Surface Soil Sampling
5-21000-OPS-FO 16	Field Radiological Measurements
4-B11-ER-OPS-FO 25	Shipping Limited Quantities of Radioactive Materials in Samples
5-21000-OPS-FO 14	Field Data Management
3-21000-ADM-5 01	Document Control
3-21000-ADM-15 01	Control of Nonconforming Items and Activities
1-50000-ADM-12 01	Control of Measuring and Test Equipment
1-50000-16 16	Corrective Action Program
5-21000-OPS-FO 02	Field Document Control
3-21000-ADM-17 01	Records Management

Table 2 3-5
Laboratory Standard Operating Procedures

Analytical Suite	Controlling Documents
VOCs	Title 40 of the Codes of Federal Regulation Part 264 Appendix IX Methods 8240 and others applicable to TCL-VOA in soils All laboratory analyses will also adhere to protocols specified in Parts A and B of the RFETS General Radiochemistry and Routine Analytical Services Protocol (GRRASP)
Radionuclides	Part B of the GRRASP
Metals	Title 40 of the Codes of Federal Regulation Part 264 Appendix IX and EPA standard methods for TCLP metals in soils All laboratory analyses will also adhere to protocols specified in Parts A and B of the RFETS General Radiochemistry and Routine Analytical Services Protocol (GRRASP)

2 4 Quality Verification

QA surveillances and audits will be periodically conducted by the ESH&Q Department throughout the duration of the project to verify remaining quality elements of the project, consistent with the graded approach of DOE Order 5700 6C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